

EXPECTANCY MODEL OF FEAR, ANXIETY, AND PANIC

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ABSTRACT. *The purposes of this article are to summarize the author's expectancy model of fear, review the recent studies evaluating this model, and suggest directions for future research. Reiss' expectancy model holds that there are three fundamental fears (called sensitivities): the fear of injury, the fear of anxiety, and the fear of negative evaluation. Thus far, research on this model has focused on the fear of anxiety (anxiety sensitivity). The major research findings are as follows: simple phobias sometimes are motivated by expectations of panic attacks; the Anxiety Sensitivity Index (ASI) is a valid and unique measure of individual differences in the fear of anxiety sensations; the ASI is superior to measures of trait anxiety in the assessment of panic disorder; anxiety sensitivity is associated with agoraphobia, simple phobia, panic disorder, and substance abuse; and anxiety sensitivity is strongly associated with fearfulness. There is some preliminary support for the hypothesis that anxiety sensitivity is a risk factor for panic disorder. It is suggested that future researchers evaluate the hypotheses that anxiety and fear are distinct phenomena; that panic attacks are intense states of fear (not intense states of anxiety); and that anxiety sensitivity is a risk factor for both fearfulness and panic disorder.*

Reiss' (1980) article on Pavlovian conditioning addressed the implications of new research developments in animal learning for applied research on anxiety and fear. A central point of this article was that animal researchers such as Kamin (1969) and Rescorla and Wagner (1971) had demonstrated that CS-UCS contiguity was neither necessary nor sufficient for Pavlovian learning. Reiss maintained that behavior therapists should reorient anxiety research away from CS-UCS contiguity models and toward expectancy and information-processing models.

Reiss and McNally (1985) outlined an expectancy model of fear based on a new concept of the fear of fear, called *anxiety sensitivity*. Because anxiety sensitivity was defined as a personality factor that enhances the person's conditionability for fear,

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the concept has similarities to Eysenck's concept of neuroticism (Rachman, in press). Because anxiety sensitivity was defined in terms of irrational beliefs, the concept has similarities to Ellis' (1979) concept of discomfort anxiety and to Clark's (1986) theory of panic. There also is some similarity between the concept of anxiety sensitivity and Rescorla and Wagner's (1972) concept of the "reinforcing effectiveness" of a UCS. Specifically, anxiety sensitivity is seen as enhancing the reinforcing effectiveness of the sensations of anxiety.

The purposes of this article are to expound Reiss' expectancy model of fear and to review the recent studies evaluating this model. Throughout this article, the phrase "Reiss' expectancy theory" will be used to avoid possible confusion with other expectancy theories.

STATEMENT OF REISS' EXPECTANCY THEORY

Reiss' expectancy theory holds that human motivation to avoid a feared object is a function of two classes of variables, called expectation and sensitivity. Expectation refers to what the person thinks will happen when the feared object/situation is encountered (e.g., "I expect the plane will crash," "I expect to have a panic attack during flight," "I expect other people will notice my fear of flying"). Sensitivity refers to the reasons a person holds for fearing the anticipated event (e.g., "I can't stand the thought of being handicapped," "Panic attacks cause heart attacks"). Expectations (what one thinks will happen) and sensitivities (why one is afraid of the anticipated event) theoretically provide the key for understanding human fears.

The model recognizes a wide range of individual differences in expectations regarding a particular object or situation (Gursky & Reiss, 1987; Rachman & Lopatka, 1986). For example, some people boarding an airplane think there is a chance that the plane will crash, whereas others think there virtually is no chance of a crash. Some people think there is a substantial likelihood that an airplane flight will cause them to have a panic attack, experience an upset stomach, or vomit; others dismiss the probability of such events as negligible. Some airplane passengers think there is a possibility they will become so fearful during a "bumpy" flight it might embarrass them, whereas others do not hold these expectations.

The model also recognizes a wide range of individual differences in people's sensitivities to fear-outcome events. Some people are terrified by fear-outcome events, whereas others do not care. Some people who expect to become anxious and stressed while flying in airplanes dismiss the bodily sensations of anxiety as harmless; other people think that anxiety experiences cause heart attacks and/or mental illness. Some people who anticipate the possibility of a plane crash dismiss the likely consequences of death or injury by telling themselves that God's will is not to be feared. Yet the very same expectations cause substantial anxiety in people who are terrified by the thought of death or of being handicapped. Some students are embarrassed, and others are not, when they fail an exam.

As suggested by these examples, phobic avoidance motivation implies the presence of both fear-outcome expectations ("I will fail the exam"; "the plane will crash") and fear-outcome sensitivities ("It would be terribly embarrassing to fail the exam," "I can't stand the thought of dying"). A formula statement of this view, called Formula A, is presented in Figure 1. Under this theory, the fear of a common object, such as the fear of flying, is a function of the following six factors:

Expectancy Theory

Let $F(S_1)$ = Fear response to an ordinary (nonreinforcing) situation, S_1 , e.g., fear of flying

Let k = Objective disasters that can be associated with feared situation, S_1 , e.g., wings falling off plane, landing gear failing to operate.

Let j = Components of anxiety reaction that can be associated with feared situation, S_1 , e.g., shaking, rapid heart beating.

Let i = Social disasters that can be associated with feared stimulus, S_1 , e.g., rejection by other passengers.

THEN,

$$F(S_1) = \alpha \sum_k (E_k \times S_d) + \beta \sum_j (E_j \times S_a) + \lambda \sum_i (E_i \times S_{fne}),$$

Where,

E_k = is the individual's expectancy of objective disaster, k , given S_1

E_j = is the individual's expectancy of anxiety component, j , given S_1

E_i = is the individual's expectancy of social disaster, i , given S_1

S_d = is the individual's sensitivity to injury/death

S_a = is the individual's sensitivity to anxiety

S_{fne} = is the individual's sensitivity to criticism

α, β, λ = are unknown weights

NOTES

1. S_d is estimated by the Injury Sensitivity Index (ISI).
2. S_a is estimated by the Anxiety Sensitivity Index (ASI).
3. S_{fne} is estimated by the Fear of Negative Evaluation (FNE) scale.
4. Gursky and Reiss (1987) developed measures of E_k (danger expectancy) and E_j (anxiety expectancy) for fears of snakes, heights, and public speaking.
5. Technically, "fear" means "avoidance motivation" or "reason to avoid".
6. Ordinary fears, $F(S_n)$'s, are fears of nonreinforcing stimuli; sensitivities (S_d, S_a, S_{fne}) are fears of negatively reinforcing stimuli.
7. The total score on a fear survey schedule is $\sum_n F(S_n)$.

FIGURE 1. Expectancy Model of Fear — Formula A.

1. *Danger expectancy*, or the person's expectation of danger/harm from the external, physical environment (e.g., "The plane is likely to crash").
2. *Injury sensitivity*, or the person's sensitivity to personal injury (e.g., "I can't stand the thought of being injured").
3. *Anxiety expectancy*, or the person's expectation of the possibility of becoming anxious or stressed (e.g., "I know that flying is safe, but I may have a panic attack or throw up during the flight").

4. *Anxiety sensitivity*, or the person's sensitivity to experiencing anxiety ("I might have a heart attack if I experience panic or become stressed").
5. *Social evaluation expectancy*, or the person's expectation of reacting to flying in ways that lead to negative evaluation ("I will not be able to master my fear of flying").
6. *Social evaluation sensitivity*, or the person's sensitivity to negative evaluation ("I am embarrassed when I fail").

REVIEW OF HYPOTHESES AND EVIDENCE

Reiss' expectancy model yielded a number of hypotheses that challenged conventional ideas and/or suggested new directions for research. The rationale and evidence for each of five hypotheses is considered here.

Hypothesis 1. Some Fears Are Motivated Partially or Wholly by Expectations and Sensitivities to Anxiety

Rationale. Reiss' expectancy theory holds that common fears can be analyzed in terms of three categorically different expectations: expectations of danger/injury from the physical environment, expectations of anxiety, and expectations of negative social evaluation. For example, if asked what would happen if forced to take an airplane flight, one person with an airplane phobia might expect the plane to crash, another might expect to have a panic attack, and a third might expect people to be embarrassed by his/her timidity. Both expectations of danger/injury, and expectations of negative social evaluation, have been recognized in many theories of fear. Reiss' expectancy theory, however, also predicts the motivational significance of expectations of anxiety and panic attacks. With the notable exception of Kirsch (1985), very few psychologists have suggested that anxiety expectancies might motivate fear.

Findings. McNally and Stekette (1985) conducted structured interviews with people with severe animal phobias. When asked what would happen if they had an unavoidable encounter with the phobic object, 41% anticipated physical attack, 91% anticipated panic attack, 18% reported concerns about insanity, 14% anticipated embarrassment, and 9% feared a heart attack. The findings provide evidence against the view that all fears are motivated by the anticipation of external, traumatic events (UCSs). Instead, the findings support Reiss' expectancy theory analysis that some fears are motivated by anticipated danger from the environment, other fears are motivated by anticipated panic attacks, and still other fears are motivated by anticipated embarrassment.

Gursky and Reiss (1987) used factor analysis to analyze the reasons underlying three common fears, the fears of flying, heights, and public speaking. For each of these fears, scales were constructed to measure danger versus anxiety expectancies. The items for the danger and anxiety expectancy scales for each fear then were combined, creating one set of pooled items for the fear of flying, another set for the fear of heights, and a third set for the fear of public speaking. For each fear, the study found that factor analysis of the pooled items recreated the scales for danger and anxiety expectancies. In fact, the results were near perfect; 51 of

53 items had factor loadings that were consistent with the distinction between danger and anxiety expectancies.

Gursky and Reiss (1987) found that danger and anxiety expectancies were specific for each fear. That is, a person could have one fear that is danger-based ("I am afraid of heights because I am afraid of falling") and another fear that is anxiety-based ("I do not worry that a snake will attack me; instead, I worry that my fear of snakes will cause me to have a panic attack if I ever encounter a snake").

Kirsch, Tennen, Wickless, Saccone, and Cody (1983) reported evidence regarding the fear-motivating effects of anxiety expectancies. This investigation compared the effects of systematic desensitization, therapeutically credible placebo, and waiting-list control conditions on fear in snake-phobic subjects recruited by a newspaper advertisement. Of primary interest here are the interrelated findings that expected anxiety was highly correlated with behavioral and self-report measures of fear at both pre- and posttreatment assessments. The results provided some evidence that anticipation of fear sometimes may lead both to subjectively experienced fear and to avoidance motivation.

Conclusion. Although much more research is needed to study the events motivating fears, the available evidence supports the hypothesis that common fears can be motivated wholly or partially by expectations of anxiety. The data are consistent with Reiss' expectancy model, as outlined in Formula A.

Hypothesis 2. Anxiety Sensitivity Is an Individual Difference Variable that Is Measured by the Anxiety Sensitivity Index

Rationale. In addition to the view that the expectation of anxiety reactions partially or wholly motivates some fears, Reiss' expectancy theory holds that there are important individual differences in sensitivity to anxiety sensations. These individual differences ("personality factors") have been called *anxiety sensitivity* (Reiss & McNally, 1985). Anxiety sensitivity is indicated by beliefs about the personal consequences of experiencing anxiety. People with high anxiety sensitivity believe that anxiety leads to heart attacks, causes mental illness, or causes additional anxiety. People with low anxiety sensitivity believe that anxiety is a harmless emotion. The *Reiss-Epstein-Gursky Anxiety Sensitivity Index* (ASI) was developed as a self-report measure of anxiety sensitivity. The ASI provides 16 statements asserting a negative consequence of experiencing anxiety (Peterson & Reiss, 1987). The subject rates the degree of agreement with each of the statements.

Researchers have addressed the following three potential objections to the concept of anxiety sensitivity: (a) that the items on the ASI do not belong together because they tap too diverse a range of anxiety consequences; (b) that anxiety sensitivity is not a personality trait; and (c) that anxiety sensitivity is trait anxiety.

Findings. One potential objection to the ASI concerns the apparent "lumping together" of statements that anxiety is embarrassing, causes illness, or produces a loss of control. Some researchers might wonder if a separate concept were needed for each of these consequences because the people who are embarrassed by anxiety are not necessarily the same people who think that anxiety causes mental or physical illness. Some factor analytic studies yielded results consistent with this possibility (Peterson & Heilbronner, 1987); (Telch, Sherms, & Lucas, 1989).

However, other studies suggested a single-factor structure (Reiss, Peterson, Gursky, & McNally, 1986; Taylor, Koch, & Crockett, 1990).

Regardless of the question of factor structure — does the ASI have a single-factor structure or one large factor with several, other smaller ones — the high degree of internal reliability for the ASI provides important support for the psychometric soundness of the measure. As measured by Cronbach's alpha coefficient, the internal reliability of the ASI was estimated at .88 by Peterson and Heibronner (1987) and at .80 by Telch et al. (1989). These findings indicate that the various items on the ASI do belong together.

Another potential objection is whether the ASI measures a transitory state or a more stable personality factor. One recent study provided evidence for the hypothesis of a stable trait. In this study, Maller (1988) found a .71 correlation between ASI scores in 1984 and ASI scores in 1987. This finding provided direct evidence that the stability of ASI scores over a long period of time is in the .6 to .8 range reported for many other personality factors.

Lilienfeld, Jacob, and Turner (1989) hypothesized that anxiety sensitivity is trait anxiety. Rolf Peterson and I searched our files for data sets in which the correlations among trait anxiety, state anxiety, and anxiety sensitivity were evaluated. Eleven samples were found in doctoral and masters-level research conducted at the University of Illinois at Chicago and at George Washington University. Without exception, these studies support the uniqueness of anxiety sensitivity. The correlations between trait anxiety and anxiety sensitivity were only moderate; specifically, across the 11 samples, the r squares ranged from 0 to a high of only 36% variance overlap. These numbers are nowhere near the levels needed to support Lilienfeld et al.'s hypothesis that anxiety sensitivity is trait anxiety. Moreover, it consistently was found that trait and state anxiety are more strongly related than trait anxiety and anxiety sensitivity. This finding suggests that Lilienfeld et al. are in the paradoxical position of asserting that variables that are strongly correlated (trait anxiety and state anxiety) are different, while those that are only moderately correlated (trait anxiety and anxiety sensitivity) are identical.

Additional evidence distinguishing between trait anxiety and anxiety sensitivity was provided by Chambless and Gracely (1989), Marks, Lindsay, and Kubaisy (1988), McNally (1989), Reiss et al. (1986), and Maller (1988). In each of these studies, anxiety sensitivity was found to explain clinical phenomena not explained by trait anxiety. For example, Marks et al. (1988) found that anxiety sensitivity accounted for significant variance in panic attack frequency beyond that accounted for by Spielberger, Gorsuch, and Lushene's (1970) Trait Anxiety Scale. Maller (1988) also obtained this finding. Taylor et al. (1990) conducted a series of psychometric studies and concluded that, at least with regard to the prediction of panic states and panic disorder, the ASI is both distinct from, and superior to, Spielberger's Trait Anxiety Scale.

Hasten and Stokes (1987) found that the ASI explains variance on Geer's (1965) Fear Survey Schedule II after the effects of negative affectivity are held constant. Negative affectivity reflects a stable and pervasive tendency to experience negative emotions such as anxiety, stress, and depression. The finding provides evidence that the ASI is unique not only when compared with trait anxiety but also when compared with the much broader personality trait of negative affect.

Conclusion. Research studies largely have resolved the potential objections to the concept of anxiety sensitivity. The high degree of internal reliability for the ASI supports the hypothesis that the ASI items belong on the same scale, even though future research may identify subscales. The .71 test–retest reliability of the ASI over a period of three years is evidence of a relatively stable individual difference factor (personality trait). The moderate level of correlation between the ASI and trait anxiety — plus replicated findings that the ASI predicts outcome variance that cannot be predicted by measures of trait anxiety, manifest anxiety, state anxiety, or negative affectivity — suggest that the ASI is a unique scale.

Today, the ASI is widely used in the assessment of anxiety disorders and has been translated and normed for use in a variety of cultures, including Spain, Germany, the Netherlands, and Formosa. The norms are stable cross-culturally for both clinical and nonclinical groups. For example, people with agoraphobia score about two standard deviations above the norm both in the United States, where the English-language ASI is used, and in Spain, where a Spanish-language translation of the ASI is used.

Hypothesis 3. High Anxiety Sensitivity Is Strongly Associated with Fearfulness. People with High Anxiety Sensitivity Should Hold Fears of Many Different Objects and Situations, Whereas People with Low Anxiety Sensitivity Should Hold Relatively Few Fears

Rationale. Reiss' expectancy theory distinguishes between fundamental fears and ordinary fears. The distinction is suggested by an analysis of the rational relationships among different fears. Fundamental fears provide reasons for fearing a wide range of stimuli, whereas ordinary fears do not have this characteristic. For example, consider the rational relationships among three different fears: (a) the fear of snakes; (b) the fear of heights; and (c) the fear of anxiety. Fears of snakes and heights are rationally unrelated to one another in the sense that having one of the fears is not a reason for having the other fear. It makes no sense for a person to say, "I am afraid of heights *because* I am afraid of snakes." On the other hand, the fear of anxiety is rationally related to the fear of snakes and heights. A rational person might say, "I am afraid of snakes and heights *because* I am afraid I would have a panic attack if I encountered those stimuli." A person who is unusually afraid of (or sensitive to) the possibility of a panic attack holds a reason for potentially fearing snakes, heights, or any other situation that might be expected to lead to panic.

As noted previously, a formula statement of Reiss' expectancy theory, called Formula A, is provided in Figure 1. Mathematically, this formula implies that people who are afraid of anxiety, injury, or negative evaluation should hold many fears. For example, Formula A implies that people who are afraid of anxiety should develop a fear of any situation in which there is even a small chance/expectation of becoming anxious; because there are many such situations, people who are extremely sensitive to anxiety should develop fears of many situations. A similar analysis holds for injury sensitivity and sensitivity to negative evaluation. Thus, Reiss' expectancy theory predicts strong relationships between individual differences in fear sensitivities and individual differences in the number of different objects and situations feared.

Findings. In a series of studies with mentally healthy adults (Reiss et al., 1986), mentally healthy children (Silverman, Fleisig, Rablan, & Peterson, in press), agoraphobics (McNally & Lorenz, 1987), and special populations (Hasten & Stokes, 1987), high correlations were found between ASI scores and the total score on a variety of fear survey schedules. These studies also found that ASI scores predict total fear survey schedule scores after controlling for the effects of state anxiety, anxiety frequency, or manifest anxiety. If you want to explain how many different objects or stimulus situations a person fears, it is much more important to know the person's level of anxiety sensitivity than it is to know the extent, magnitude, or frequency of anxiety in the person's life now or in the past.

Formula A predicts that injury sensitivity and negative evaluation sensitivity also are highly correlated with fearfulness. This prediction recently was confirmed in studies reported by Reiss, Peterson, and Cursky (1988) and Reiss, Altman, Belzer, Fetzer, Graves, and Kavesh (1989). These studies found correlations of about .5 between the sum of sensitivity scores and the total score on a nonredundant fear survey schedule. (The Nonredundant Fear Survey Schedule was designed to correct for two problems with other fear survey schedules: the repetition of certain stimulus items, and the intermixing of stimulus items tapping common fears with stimulus items tapping fundamental fears.) The data support the counterintuitive prediction that individual differences in fearfulness to a wide range of ordinary stimulus situations can be predicted well from individual differences in only two or three fundamental fears.

Silverman, Fleisig, Rablan, & Peterson (in press) developed a Children's Anxiety Sensitivity Index (CASI). These researchers found that the CASI predicted variance in the Fear Survey Schedule for Children — Revised that could not be accounted for by measures of anxiety frequency. The finding extends to children the strong relationship between anxiety sensitivity and fearfulness.

Conclusion. The findings support Reiss' expectancy theory. The strong relationship between anxiety sensitivity and fearfulness was found in a number of replicated psychometric studies. The prediction of similarly strong relationships for injury sensitivity and negative evaluation sensitivity was supported by two recent psychometric studies.

Hypothesis 4. Anxiety Sensitivity Is Not Found Exclusively in Agoraphobia

Rationale. Prior to Reiss' expectancy theory, Goldstein and Chambless' (1978) influential theory held that the fear of anxiety was one of several necessary and sufficient conditions for agoraphobia. According to Goldstein and Chambless, people with agoraphobia are afraid of going outside primarily because they are afraid of having a panic attack. Whether intended or not, this position seemed to imply that elevated levels of anxiety sensitivity would be found only in patients with agoraphobia.

Reiss and McNally (1985) rejected the conventional wisdom of the early 1980s that the fear of anxiety was found only in agoraphobia. It was suggested instead that anxiety sensitivity is relevant for understanding fears, placebos, and a wide range of anxiety-relevant phenomena (Reiss & McNally, 1985; Reiss, 1987). In this regard, Reiss' expectancy theory reaffirmed the ideas of Frankl (1959), Ellis (1978), and Rachman (1978, pp. 261–262) that the fear of anxiety was relevant for understanding a much wider range of phenomena than just agoraphobia.

Findings. Although people with agoraphobia score about two standard deviations above the ASI norm (Peterson & Reiss, 1987), people with other disorders also score high on the ASI. For example, people with simple phobias score about one standard deviation above the ASI norm (Reiss et al., 1986); people with posttraumatic stress disorder score about 1.5 standard deviations above the ASI norm (McNally, Luedke, Besyner, Peterson, Bohm, & Lips, 1987); and people with panic disorder score about two standard deviations above the ASI norm (Margraf, Ehlers, & Roth, 1986; Rapee, Ancis, & Barlow, 1988).

Chambless and Gracely (1989) found associations between the fear of anxiety and anxiety disorders other than agoraphobia. These investigators used Chambless' fear of anxiety scales, called the Agoraphobic Cognitions Questionnaire (ACQ) and the Body Sensations Questionnaire (BSQ), rather than the ASI. Although people with agoraphobia scored very high on both the ASQ and the BSQ, above-norm scores on one or both of the scales also were found for people with depression, social phobia, panic disorder, and other anxiety conditions.

There is some evidence linking anxiety sensitivity to substance abuse. McNally et al. (1987) reported ASI scores 1.7 standard deviations above the norm for 20 Vietnam veterans with heroin dependency. McNally subsequently reported similarly high scores for a sample of 53 patients with DSM-III R alcohol dependence and no concurrent anxiety disorder (IDS, 1989). For a sample of 87 college students who were selected from a larger sample of 300, Graves found that ASI scores were positively and significantly correlated with having an alcoholic parent (IDS, 1989). Graves also found that the ASI was a significantly better predictor of having an alcoholic parent than were measures of Internal and External Control and Desirability of Control. Finally, a study conducted at George Washington University by Karp (1989) found some preliminary support for the hypothesis that anxiety sensitivity is associated with alcohol and drug use to reduce anxiety/tension.

McNally (personal communication, 1989) suspects that anxiety sensitivity is positively related to drug use that dampens arousal (e.g., heroin, alcohol, benzodiazepines), and negatively associated with drug use that enhances arousal (e.g., crack, amphetamine). However, this interesting hypothesis has not yet been evaluated empirically.

Conclusion. The hypothesis that anxiety sensitivity is not exclusively associated with agoraphobia has been well substantiated. On the one hand, there is an exceptionally strong relationship between anxiety sensitivity and agoraphobia. On the other hand, high levels of anxiety sensitivity also are associated with simple phobia, substance abuse, posttraumatic stress disorder, and other clinical disorders (Chambless & Gracely, 1989; Reiss et al., 1986). Much additional research is needed to evaluate the role of anxiety sensitivity in psychopathology.

Hypothesis 5. Anxiety Sensitivity Is a Risk Factor for Anxiety Disorders

Rationale. When Reiss' expectancy theory first was proposed, many researchers viewed the fear of anxiety as a secondary consequence of panic attacks. The basic idea was that people who have initial panic attacks learn to fear the possibility of subsequent panic attacks, producing the fear of fear phenomenon. In contrast, expectancy theory implied that anxiety sensitivity can precede panic attacks and may be a risk factor for anxiety disorders and panic attacks (Reiss & McNally,

1985; Reiss, 1987). There may be a vicious circle in which anxiety sensitivity increases the risk of panic attacks, and panic attacks increase the level of anxiety sensitivity. For example, consider the possible effects of a high degree of anxiety sensitivity on a man with marital problems. When the man becomes anxious worrying about his marital problems, the man also should start worrying about the possibility of a heart attack, mental illness, or some other calamity. The additional worry should cause additional stress, so that a vicious circle could develop in which life problems produce anxiety/stress, and anxiety/stress produces additional anxiety/stress. Ultimately, a high level of anxiety, worry, and preoccupation with anticipated anxiety should increase the risk of an anxiety disorder. In contrast, a man who has a low degree of anxiety sensitivity might interpret the anxiety associated with marital discord as nothing more than an unpleasant state of temporary nervousness that will dissipate when the marital problems are resolved. Although this person might worry about his marital problems, there should be little additional worry about the consequences of experiencing anxiety. Thus, there should be no vicious circle in which life problems produce anxiety/stress, and anxiety/stress produces additional anxiety/stress.

Findings. Recent studies provided some preliminary support for the hypothesis that anxiety sensitivity may be a risk factor for anxiety disorders. In a longitudinal study of 23 people with high anxiety sensitivity and 25 people with low anxiety sensitivity, Maller (1987) found that ASI scores in 1984 predicted the frequency and intensity of panic attacks and anxiety disorders in 1987. The subjects with high ASI scores in 1984 were five times more likely to have anxiety disorders in 1987. ASI plus five demographic variables in 1984 predicted panic attacks in 1987 with 92 percent accuracy.

The Maller study included four subjects who developed anxiety disorders during the period of 1984 to 1987. Three of these subjects tested very high for anxiety sensitivity in 1984 prior to the onset of an anxiety disorder. For these subjects, anxiety sensitivity appears to have been a predictor of the development of an anxiety disorder. Of course, three subjects represent too small a sample to conclude that anxiety sensitivity is in fact a risk factor for anxiety disorder.

Donnell and McNally (1989) evaluated the hypothesis that high anxiety sensitivity can precede unpredictable ("spontaneous") panic attacks of the type associated with psychopathology. These investigators administered the ASI and the "Panic Attack Questionnaire" (Norton, Dorward, & Cox, 1986) to 425 college students. High ASI subjects more frequently reported both a personal and a family history of panic than did subjects in the other groups. Nevertheless, two-thirds of the high ASI subjects had never experienced an unpredictable panic attack. The investigators interpreted these data as support for the hypothesis that anxiety sensitivity can precede unpredictable panic attacks and is not necessarily always a consequence of such attacks.

The possibility that anxiety sensitivity may be a risk factor for panic attacks was evaluated by Holloway and McNally (1987) and by Donnell and McNally (1989). These investigators found that anxiety sensitivity enhances reactions to a biological challenge, hyperventilation, even after controlling for the effects of both trait anxiety (McNally, 1989) and prior history of panic (Donnell & McNally, 1989).

Conclusion. Preliminary support for the hypothesis of a risk factor has been provided by an initial longitudinal study, by a retroactive study, and by research on

reactions to biological challenge. Although these results are encouraging, additional longitudinal studies are needed before the issue can be resolved.

GENERAL DISCUSSION

Reiss' expectancy theory has had some heuristic value. The theory predicted that the fear of fear is not found exclusively in agoraphobia; subsequently, a number of studies found that high anxiety sensitivity is associated with simple phobia, substance abuse, and other disorders (Chambless & Gracely, 1989; McNally et al., 1987; Reiss et al., 1986). The model predicted that anxiety sensitivity is both a risk factor and a consequence of panic attacks and/or anxiety disorders; the preliminary research supported this prediction (Donnell & McNally, 1989; Holloway & McNally, 1987; Maller, 1988). The theory also led to the development of a reliable, valid, and unique measure called the *Anxiety Sensitivity Index* (Peterson & Reiss, 1987). Data from several studies suggest that the ASI is significantly superior to measures of trait anxiety and measures of anxiety in the prediction of panic attacks and panic disorder (Taylor et al., 1990). Recently, a children's ASI has been developed (Silverman et al., in press).

Future researchers should evaluate in more detail the relationships among anxiety, fear, and panic. In this context, two interesting findings seem to be emerging from the psychometric research on Reiss' expectancy theory. One finding is that the correlations between measures of anxiety and measures of fear are surprisingly moderate. For example, Reiss et al. (1986) found correlations of only .42 between the total score of the Fear Survey Schedule-II and a measure of anxiety frequency. The *r*-square was only 17.6%. The other finding is that anxiety sensitivity, fearfulness, and panic attacks are highly intercorrelated. It may be that anxiety and fear are distinct phenomena and that panic is an intense state of fearfulness (not an intense state of anxiety).

Another issue that should be explored by future researchers is the question of anxiety sensitivity as a risk factor for fearfulness and panic disorder. In this era of increasing attention to the biological aspects of psychopathology, what could demonstrate better the relevance of cognitive processes than evidence of risk factors? The identification of risk factors would create exciting new research opportunities on possible causes of anxiety disorders and methods of prevention. In the past, it was unclear how to identify high-risk groups for longitudinal study. Today, it is theoretically possible that the ASI may identify people at risk for panic disorder.

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